BULGARIA'S INDEPENDENT ENERGY EXCHANGE – POSSIBILITIES FOR RISK MANAGEMENT

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Abstract: This article discusses the urgent problems of the Bulgarian energy market and its slow transformation from state monopoly to free exchange market. The paper aims at elaborating on the specific aspects of energy trading – basically, and in particular, the characteristics and disproportions imposed by the state and the state-owned energy holdings on the Bulgarian market. Ever since its establishment in 2014, the Bulgarian Independent Energy Exchange (BIEE) has adopted the model and rules of the north energy exchange – Nord Pool. The arguments for this choice have not been discussed publicly, but the necessity of a well-functioning energy exchange market and the need of its daily transparent activity, already in Bulgaria as well, are accepted as proven. The functioning and reliability of the Bulgarian stock exchange, however, are still the subject of certain discussions. What could have happened if the Bulgarian stock exchange had adopted the model of the European energy exchange – EEE?

Key words: energy market, energy price, energy exchange.
JEL: D 43, L 94, Q 41, Q 43.

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The long-term trend of increase of the prices of various energy carriers means that people throughout the world need to be better informed about the problems of production, supply, distribution and pricing which every user pays. Energy is a commodity which every person in Europe uses daily. It is the subject of trade deals, just as any other commodity, i.e., everyone wants to have it at home or at work, but someone must produce it and deliver it to the end-user. One of energy's specific characteristics is that it cannot be stored in

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a warehouse, i.e., once it is produced, it must be consumed – reach the end-user. The produced energy must be consumed at the same moment. This is a rather complicated technological problem, which must be solved by the system operator of the corresponding country.

This article aims at elaborating on the specific aspects of energy trading as well as the disproportions on the Bulgarian market, at proposing discussion aspects related to the functioning of the Bulgarian independent energy exchange and at making a comparative analysis with the European energy exchange – EEE.

The research does not aim at:

- analyzing the financial state of the Bulgarian Energy Holding, the National Electricity Company and other stake holders in energy trading on the territory of the Republic of Bulgaria;

- analyzing the whole process of regulation of the Bulgarian energy market;

- commenting and comparing the positions of the various energy producers on the Bulgarian market, as well as the possibilities for balancing (the technological problems of the energy system).

The legislative framework for energy trading in the Republic of Bulgaria has been developed in compliance with Directive 2009/72/EO (/72/EO, 2009) defining the general regulations for domestic energy trading.

The expected general actions and aims to be completed by the EU member states can be summarized and presented as follows:

Entirely open energy market which allows all users to choose freely who they shall supply energy to and all suppliers to freely supply energy to their end-users.

The production and supply of energy shall be separated which will create conditions for loyal competition and possibilities for market impact on the changes in the prices of energy.

The competitive equality of all users by objective, transparent and non-discriminatory criteria, as well as granting access of third parties to the transmission and distribution systems in compliance with the requirements for complete opening of the market.

Energy production has always been regionally dependent. The maximum possible production by all energy producers is defined as the maximum capacity on this territory.

Energy transmission shall be separate from energy production and trade.

Energy market, similar to the market of other energy carriers, shall be transformed from state monopoly into efficient market with the help of appropriate regulations. This process involves the organization of a spot trading market and "the development of temporary market for derivatives on contracts for the delivery of energy." (Hull, 2009, p. 714). Those derivatives are accepted as a major tool for risk management in trade deals on any market, while the Bulgarian independent energy exchange cannot make an exception and does not have an authorized temporary market.

Stages and characteristics in the development of the Bulgarian energy market

In 2008 the Bulgarian government decides to unite the energy holdings in Bulgaria into Bulgarian Energy Holding (BEH), which comprises the National Electricity Company (NEC), Kozloduy NPP, Maritsa East 2 TPP, Mini Maritsa Iztok, Bulgargaz and Bulgartel.

The development of energy production for the period 2008–2017 is presented in the table below:

Table 1

Indicator	Year									
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Gross production of power plants to power grids [TWh]	44.8	42.5	46.3	50.1	47.2	43.7	45.7	46.1	42.1	42.6
changes in % compared to the previous year		(5.1%)	8.9%	8.2%	(5.8%)	(7.4%)	4.6%	0.9%	(8.7%)	1.2%
Physical export [TWh]	8.4	7.7	9.6	12.1	10.7	9.5	13.7	14.7	10.9	9.2
changes in % compared to the previous year		(8.3%)	24.7%	26.0%	(11.6%)	(11.2%)	44.2%	7.3%	(25.9%)	(15.6%)

Source: Electricity System Operator Ltd and EWRC[2] annual reports to the European Commission for 2017 and 2018.

PG – power grid; PP – power plant; Physical import – the actual imported energy in the Republic of Bulgaria from neighbouring countries; Physical export – the actual exported energy from the Republic of Bulgaria to neighbouring countries.

[2] Energy and Water Regulatory Commission

The annual energy production for the period varies between 42.1 and 50.1 terawatt hours, which indicates fluctuations of the gross annual production from 4 % to 16 % towards the minimum value. For the ten-year period, a total of 451.5 TWh are produced in Bulgaria.

The supply of energy in the Republic of Bulgaria is carried out only through the power grid of the Electricity System Operator Ltd, which, since 2014, has been an independent state-owned company within the BEH, because "…Bulgaria has chosen the model of 'an independent transmission operator'" (EWRC, July 2018, p. 8).

Energy consumption is irregular during the day and at night, which requires from the System operator of the corresponding territory to temporarily shut down specific producers (the period of scheduled power stops is several hours for WPP and TPP and two to three days for NPP – correspondingly the same time period is necessary to bring them back to production mode.), or to add new producers to the system, because the system shall always be balanced – it shall produce exactly the same amount of energy that will be consumed. A classic example of a balanced energy system is a water power plant, which in peak hours produces energy, and then becomes a consumer and starts to pump water back up in order to use it continuously for energy production.

The Energy and Water Regulatory Commission (EWRC) is the principal regulatory organ. Article 23 of the Energy Act (Energy Act) defines the general principles which the Commission shall follow in carrying out its regulatory authority. Those principles are fully compatible with the requirements of the European Directive 2009/72/EC, but their implementation is usually accompanied by controversial comments and views by various specialists in the field.

Establishment and development of the energy exchange

Decision № L -422 of 31 March 2014 of WRSC[3] grants license for the activity of "establishing a stock exchange for electrical energy" for a period of ten years to the state-owned company, part of the Bulgarian Energy Holding (BEN) – "Bulgarian Independent Energy Exchange - LTD". This company shall use the technological and material resources of the Electricity System Operator LTD – for this purpose, the system operator makes a commitment to isolate, restructure and provide the module Organized Market "Day- ahead", which has been part of the energy market in Bulgaria since 2010.

[3] Water Regulation State Commission

A business plan is presented by the Bulgarian Independent Energy Exchange LTD for the period 2014–2018, which foresees starting the activity in 2014 and expanding it 2016 by purchasing a platform for market coupling, which will allow them to organize the market exchange within a particular day. It is foreseen that in 2014 a little over 4 TWh of energy will be traded on the stock market, while in 2018 this amount will double to 8.5 TWh. The presented business plan is for four years, while the granted license is for ten years. Interest is also expressed by the private company Bulgarian Energy Exchange, which also applies for being granted this license, but it is not approved.

The amounts of energy sold by the BIEE increase in 2017 by 167%, but as an amount of money they are twice as little as the planned development of the exchange trade described in the first business plan. *„The total volume of the traded amounts in 2017 is 4,233,800 MWh. The growth towards the traded amounts in 2016 – 2,505,209 MWh is 167%* (EWRC, July 2018, p. 26). A little over 4 TWh is the expectation of annual turnover on the exchange during the first year of its establishment, i.e., for 2014. The reasons for this are numerous and various, but the fact that the amounts of energy sold on the exchange are average annual below 10% of the produced energy per year shows that the exchange market still does not play decisive role in the pricing of energy.

Only in February 2018 does the process of registration of the participants in the Intraday market start. At the same time, the Bulgarian Stock Exchange – Sofia PLC acquires the Bulgarian Independent Energy Exchange. This change of ownership is significant for its future development, but it will hardly solve the existing problems. The Bulgarian Stock Exchange works with the platform of the German exchange Xetra, while the BIEE uses platforms by Nord Pool for Day-ahead markets and for the Intraday market. The centralized market for bilateral agreements uses the Trayport platform. Some analysts think that certain imperfections in the used platforms lead to incidents such as the one of 11 October 2018 – due to technical error, a participant in the trade enters an order of larger amounts and as a result, the average price of BGN 595.98 increases to over BGN 5034.01 within 22 hours (BIEE, Minutes of a meeting of the Exchange board at the BIEE LTD of 19 October 2018, 2018). This necessitates new price calculation. It is also noted that talks are held with NordPool "on the necessity of an automated system of changing and validating offers, but concrete decisions have not yet been agreed upon". Such cases cause problems not only on the stock market and the participants in it, but they also carry risk for the energy balance in Bulgaria.

The BIEE has published information on its website that *"According to the agreement for cooperation with the Bulgarian Independent Energy Exchange LTD on 3 June 2019, the European Energy Exchange (EEX) will expand its product range on the derivatives market with new energy futures."*

(BIEE). However, it does not point out that the futures for Bulgaria and Serbia will be cash settled (at expiration the position will be netted in cash), while the actual target of the EEX is at twenty market areas in Central and Eastern Europe.

The European Energy Exchange is part of the group of German exchanges and the author is convinced that had the German model of exchange trade been adopted at the beginning, the results of the BIEE would have been significantly higher, which is why the main emphasis is placed on how the European Energy Exchange is organized.

A sector for the sale of energy is added to the Gruppe Deutsche Börse in Frankfurt in 2000. The exchange is named European Energy Exchange EEX. The structure of the exchange equity is: 52 % – ownership of energy traders from Europe, owners of energy power grids, banks, etc., while the remaining 48% are owned by Eurex – the largest temporary market in the world.

Spot trading starts with 32 participants from 6 countries. This hints at the possibility for the exchange to become center of energy trade with Central Europe, as it shall be turned into a center for trade with energy resources in Europe.

Since March 2001, a temporary market has been in operation; its function is to provide an opportunity to relate the physical energy supply by the cash market with the possibilities for risk management through temporary deals at minimal expenses on transactions. The exchange is sufficiently transparent and offers full liquidity of the deals on the basis of perfect regulations and the functioning of a clearing corporation.

Deals are concluded on the EEX with all types of energy carriers: electricity, natural gas, coal, petrol, quotas for emissions, etc.

Spot trading energy market – EPEX SPOT is spot trading market for energy, which will initially unite the markets of France, Germany, Austria and Switzerland. Altogether, those countries for a third of the energy consumption in Europe. The company's headquarters are in Paris with subsidiaries in Leipzig, Bern and Vienna. It is established in 2008 following the merger of the energy exchanges Powernext from France and EEX AG from Germany. The owner's equity of EPEX SPOT SE is equally shared between EEX AG and Powernext SA. The company EPEX SPOT SE is responsible for the activity of the European Energy Exchange. In 2017, on this market, 534.7 TWh are sold, (EEX, Annual Report 2017, 2018, p. 17), which as a relative ratio is over 30% of the consumed energy.

The exchange mechanism allows classifying the offers as legally binding agreements for purchasing and sale of certain amount of energy in a certain delivery zone at a certain price (the so-called market clearing price). By rule,

this price shall never exceed the purchasing price set by the buyer or be lower than the sale price offered by the seller.

The concluded deals on the exchange are entered immediately at the central counterparty on each deal – European Commodity Clearing – ECC (EEX, Bedingungen fuer den Handel an der EEX, 2015, p. 25). It is the central counterparty for all purchasers and sellers, who, by rule do not know each other. The clearing organization always serves as a universal intermediary between the purchaser and the seller, i.e., it guarantees the obligations of the purchaser to the seller (the energy will be paid for) and those of the seller to the purchaser (the energy will be supplied). The clearing informs the involved power grid operators in the delivery zones, receives information about the actual transmitted energy and requires the monies from the purchaser in order to transfer them to the seller.

An important result of the exchange trade is that EPEX SPOT publishes daily exchange prices, which are determined through a direct estimation of the demand and supply. Since these deals are the result of a large, open and transparent competition among the orders placed by the exchange members, they reflect the best available information at this moment on the market.

Usually, spot trading is organized "day-ahead" or "intraday".

On the *"day-ahead"* market, the contracts traded today are to be delivered tomorrow. Basically, such contracts provide for the delivery of 1 MW/h for each astronomical hour of the day. Such contracts are referred to as "base". However, there are contracts that encompass peak hours, i.e., the time of peak consumption, hours of sunshine or hours without active energy consumption. Spot trading guarantees that the price truly reflects the current ratio between the demand and supply of energy. The professional organization of exchange trade on the energy market aims at maximum proximity of the prices of energy to the equilibrium prices of energy at any moment, i.e., the price always reflects the current demand and supply ratio.

On the *"intraday"* spot market, trading is possible for up to 45 minutes before the moment of delivery. Every trader on the exchange can purchase or sell any amounts of energy whose delivery will begin in 45 minutes. The proposed flexibility is greeted by the participants on the market. They apply a Flexible Intraday Trading Scheme (FITS), which provides new opportunities for transborder trade among France, Germany, Austria and Switzerland.

The German and Austrian markets can benefit from **"15- and 30-minute contracts"**, i.e., energy can be purchased and sold at certain 15 or 30 minutes of the day. Since December 2011, these contracts have helped the participants in exchange trade to overcome better the fluctuations of the peaks and drops in the production, especially, of green energy. The end result is better

balance on the market in a certain region. Since the introduction of the 15-minute contract, its volume has been 1 TWh. As a whole, the sales of 15-minute contracts amount to 10% of the volume on the German daily market. For 2017, on the "intraday" market, the registered average day turnover is of 71 TWh. (EEX, Annual Report 2017, 2018, p. 16).

Renewable energy in Europe has an increased significance. The 20/20/20 policy of the European Union aims at decreasing the emissions by 20 %, while the ratio of energy from renewable sources is expected to rise to 20% in 2020. There is a clear message that the production capacity of green energy over the last decade can grow. This growth is powered by political, economic and ecological motivation, thanks to the increased significance of the renewable energy sources in Europe's energy mix over the next decades. Germany boasts the largest market of green energy in EPEX SPOT – currently, around 22% of energy comes from renewable sources. This ratio is expected to rise to 35% until 2020 and to reach 80% before 2050.

The participants on the spot market EPEX SPOT are constantly increasing and currently they come from 30 countries, including licensed traders from Romania and Greece. The map showing the geographical location of the participants in the trade on the European Energy Exchange is indicative of why Bulgaria has not participated in it.

Schematically described, the exchange process shall guarantee:

– just and adequate behavior of the members of the exchange as equal participants in the energy trade;

– guaranteed delivery and payment of the contracted energy, i.e., guaranteed liquidity on the market;

– anonymity of the deals – producers do not know who they sell to, while purchasers who they actually purchase from, i.e., there can be no trade among related parties;

– transparency in determining the price change according to the demand and supply for any moment during the day.

Temporary deals (derivatives) for supply of energy are of particular interest. On the European Energy Exchange (EEX) the volume of temporary deals increases by 57 % (for March 2019 – 348.3 TWh, compared to March 2018 – 222.4 TWh), while the total volume of traded energy for 2018 is 4385.5 TWh (EEX, 2019, p. 4). The amounts sold are ten times as high as those on the spot market. The sale of energy during the day before the physical delivery and signing temporary deals for delivery in the future provide an actual opportunity for accurate reporting of the demand and supply, as well as better opportunities for risk management through the specific capacity of energy derivatives. Every producer can choose whether to sell at a loss at a particular time zone, whether

to accept the losses caused by forced shut down of its powers, because the system operator does not have a purchaser for this energy due to the fact that at this particular moment no one needs to purchase or consume this amount.

Along with the spot deals on the spot market, there can be three major types of temporary deals. On the temporary market, three types of futures are on offer – physical delivery futures, financial futures and options. They have an analogous way of determining the price – at an auction or at a current setting of the price.

Futures contracts for energy delivery are of two major types – futures with physical delivery and financial futures.

On the European Energy Exchange futures are traded for physical energy delivery on the territories of France, Belgium and the Netherlands, as follows:

- Belgian-Power-Baseload-Month/Quarter/Year-Futures;
- Dutch-Power-Baseload-Month/Quarter/Year-Futures;
- Dutch-Power-Peakload-Month/Quarter/Year-Futures;
- French-Power-Baseload-Week/Month/Quarter/Year-Futures;
- French-Power-Peakload-Week/Month/Quarter/Year-Futures.

Those futures are settled with a physical delivery of the total amount of energy for the whole contracted period. On the last trading day (for weekly futures) and two exchange days before the delivery period of monthly futures "the settlement price" of the futures is calculated. This is usually the last price at settling the trade with these futures. The purchaser of futures contract shall receive the total contracted amount of energy for the whole contract period and shall pay for it at the settlement price. The seller of the futures contract shall deliver the contracted energy with constant parameters for every day and hour for the period of delivery. Usually, the contracts state delivery of 1 MWh of energy for every astronomical hour for the period of delivery.

The settlement price of financial futures is determined by calculating a certain index which averages the auction prices at every hour on the "day-ahead" spot market for every separate market territory. Usually, prices are determined for baseload, for peakload and correspondingly, without peakload. Financial futures can only be settled by netting the position in cash, i.e., there is no physical energy delivery. On the day of expiration, the financial futures purchaser shall pay the difference between the futures price and the determined lower settlement price. If the settlement price is higher than the futures price, then the difference is covered by the seller of the futures contract. This payment shall be made no later than two days of the clearing expiration.

The transformation from state monopoly in energy to free exchange market is complete when the participants in the trade start signing deals among each other by conforming to transparent exchange rules and guaranteed equality of all participants in the market.

This market shall offer the signing of temporary deals (futures and options) at perfect regulation, because with the appropriate selection of temporary deals, the interest of every participant in the energy trade will be protected from unwanted risk.

In conclusion, we shall point out that the European Energy Exchange (EEE) in reality provides a perfect market mechanism for determining the exchange prices of Europe's energy carriers, and in particular, the energy itself. In addition, apparently, Bulgaria's territory has remained outside the European Energy Exchange market, which according to the author does not deserve acknowledgment. In the middle of 2017, the EEE is joined by the Prague Energy Exchange. The Bulgarian energy market can join the European Energy Exchange only by organizing spot and temporary market following their model. The spot market will determine the wholesale energy price based on monetary demand and supply on the Bulgarian market. The temporary market will provide the participants with futures and options so that every participant can choose additional protection of the selected position. If the Bulgarian Independent Energy Exchange decides to join the European Energy Exchange, this will be a clear sign that no new disproportions will accumulate, while the consumers' bills will become transparent and foreseeable.

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ISSN 0323-9004

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